

[BATTERY WITH BUILT-IN LOAD LEVELING]

Abstract of Disclosure

An integrated battery by incorporating battery elements, supercapacitors elements, and miniaturized electronic controllers within a single housing is devised. The supercapacitors provide a load leveling for the battery elements at both charging and discharging. So long as the rated working voltage of supercapacitor is complied, the capacitor can be charged with charging currents of any magnitude. Then, the energy stored in the supercapacitors can be transferred from the capacitors to the batteries resulted in fast charging and energy conservation. With load leveling provided by the supercapacitors, the batteries are set to constantly discharge at 1C or lower rates and their residual energy near the end of discharge cycle can become useful as well. Therefore, the service run time, cycle life, and energy utilization of the batteries integrated are improved. In addition, the supercapacitor can be a built-in actuator to provide powers to in-cell air management systems for generating air draft inside metal-air batteries and fuel cells to increase their shelf life and power density.

Figures